EMERGENCY AND REMEDIAL RESPONSE PLAN
40 CFR 146.94(a)

Project Minerva

1.0 Facility Information

Facility name: Project Minerva
Wells 1-4

Facility contact: Benjamin Heard, Principal
2417 Shell Beach Drive, Lake Charles, Louisiana 70601
(713) 320-2497, bheard@gcscarbon.com

Well location: Calcasieu/Cameron Parish, Louisiana
Well No 1: [redacted]
Well No 2:
Well No 3:
Well No 4:

2.0 Introduction

This Emergency and Remedial Response Plan (ERRP) describes actions that Gulf Coast Sequestration (GCS) shall take to address movement of the injection fluid or formation fluid in a manner that may endanger an underground source of drinking water (USDW) during the construction, operation, or post-injection site care periods.

If GCS obtains evidence that the injected CO_2 stream and/or associated pressure front may cause an endangerment to a USDW, GCS must perform the following actions:

1. Initiate shutdown plan for the injection well.
2. Take all steps reasonably necessary to identify and characterize any release.
3. Notify the permitting agency (UIC Program Director) of the emergency event within 24 hours.
4. Implement applicable portions of the approved ERRP.

Where the phrase "initiate shutdown plan" is used, the following protocol will be employed: GCS will immediately cease injection. However, in some circumstances, GCS will, in consultation with the UIC Program Director, determine whether gradual cessation of injection (using the parameters set forth in Attachment A of the Class VI permit) is appropriate.

3.0 Local Resources and Infrastructure

Resources in the vicinity of Project Minerva that may be affected as a result of an emergency event at the project site include:

- Local USDW

Infrastructure in the vicinity of the Project Minerva that that may be affected as a result of an emergency at the project site include:

- Pipelines;
- Three active and two shut-in oil and gas wells in the Vinton Dome area; and
- Four active ground water wells.

Resources and infrastructure addressed in this plan are shown in Figure 3.1

Figure 3.1 Regional map showing all active infrastructure within, or intersecting, the Area of Review

4.0 Potential Risk Scenarios

The following events related to the Project Minerva that could potentially result in an emergency response:

- Injection or monitoring? (verification) well integrity failure;
- Injection well monitoring equipment failure (e.g., shut-off valve or pressure gauge, etc.);
- A natural disaster (e.g., earthquake, tornado, hurricane, lightning strike);
- Fluid (e.g., brine) leakage to a USDW;
- CO_2 leakage to USDW or land surface; or
- Significant induced seismic event, of level Orange or Magenta in Table 4.2.

Response actions will depend on the severity of the event(s) triggering an emergency response. "Emergency events" are categorized as shown in Table 4.1

Table 4.1 Degrees of risk for emergency events.

Emergency Condition	Definition
Major emergency	Event poses immediate substantial risk to human health, resources, or infrastructure. Emergency actions involving local authorities (evacuation or isolation of areas) should be initiated.
Serious emergency	Event poses potential serious (or significant) near term risk to human health, resources, or infrastructure if conditions worsen or no response actions taken.
Minor emergency	Event poses no immediate risk to human health, resources, or infrastructure.

4.1 Emergency Identification and Response Actions

Steps to identify and characterize the event will be dependent on the specific issue identified, and the severity of the event. The potential risk scenarios identified in Part 2 are detailed below.

4.1.1 Well Integrity Failure

Integrity loss of the injection well may may endanger USDWs. Integrity loss may have occurred if the following events occur:

- Automatic shutdown devices are activated:
    - Wellhead pressure exceeds the specified shutdown pressure specified in the permit.
    - Annulus pressure indicates a loss of external or internal well containment.

  - Pursuant to 40 CFR 146.91(c)(3), Project Minerva must notify the UIC Program Director within 24 hours of any triggering of a shut-off system (i.e., down-hole or at the surface).
- Mechanical integrity test results identify a loss of mechanical integrity.

Response actions:

- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- For a Major or Serious emergency:
  - Initiate response plan.
  - If contamination is detected, identify and implement appropriate remedial actions (in consultation with the UIC Program Director).
- For a Minor emergency:
  - Conduct assessment to determine whether there has been a loss of mechanical integrity.
  - If there has been a loss of mechanical integrity, initiate response plan.

4.1.2 Injection Well Monitoring Equipment Failure

The failure of monitoring equipment for wellhead pressure, temperature, and/or annulus pressure may indicate an inability to monitor the well which could lead to a loss of mechanical integrity being detected.

Response actions:

- For a Minor emergency:
  - Restore monitoring capability.
  - Conduct assessment to determine whether there has been a loss of mechanical integrity.
  - If there has been a loss of mechanical integrity, initiate response plan.

4.1.3 Potential Brine or CO_2 Leakage to USDW

Elevated concentrations of indicator parameter(s) in groundwater sample(s) or other evidence of fluid (brine) or CO_2 leakage into a USDW.

Response actions:

- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).

- Determine the severity of the event, based on the information available, within 24 hours of notification.
- For all emergencies (Major, Serious, or Minor):
    - Initiate response plan.
    - If the presence of indicator parameters is confirmed, develop (in consultation with the UIC Program Director) a case-specific work plan.
    - For the USDW identified in Figure 3.1 that is being utilized as potable water supply and has been caused to exceed drinking water standards, arrange for an alternate potable water supply.
    - Proceed with efforts to remediate USDW to mitigate any unsafe conditions.
    - Continue groundwater remediation and monitoring on a frequent basis (frequency to be determined by Project Minerva and the UIC Program Director) until unacceptable adverse USDW impact has been fully addressed.

4.1.4 Natural Disaster

Well problems (integrity loss, leakage, or malfunction) may arise as a result of a natural disaster affecting the normal operation of the injection well. An earthquake may disturb surface and/or subsurface facilities; and weather-related disasters (e.g., tornado, hurricane or lightning strike) may affect surface facilities.

If a natural disaster occurs that affects normal operation of the injection well, perform the following:

Response actions:

- Notify the UIC Program Director within 24 hours of the emergency event, per 40 CFR 146.91(c).
- Determine the severity of the event, based on the information available, within 24 hours of notification.
- For a Major emergency:
    - Initiate shutdown plan.
    - If contamination or endangerment is detected, identify and implement appropriate remedial actions (in consultation with the UIC Program Director).
- For a Major or Minor emergency:
    - Conduct assessment to determine whether there has been a loss of mechanical integrity.
    - If there has been a loss of mechanical integrity, initiate response plan.

4.1.5 Induced Seismic Event

Based on the project operating conditions, it is highly unlikely that injection operations would ever induce a seismic event outside the AoR. Therefore this portion of the response plan is developed for any seismic event within the AoR (see Figure 3.1).

To monitor the area for seismicity, the DAS fibre will be set to detect seismic events.

Based on the periodic analysis of the monitoring data, observed level of seismic activity, and local reporting of felt events, the site will be assigned an operating state. The operating state is determined using threshold criteria which correspond to the site's potential risk and level of seismic activity. The operating state provides operating personnel information about the potential risk of further seismic activity and guides them through a series of response actions.

The seismic monitoring system structure is presented in Table 4.2. The table corresponds each level of operating state with the threshold conditions and operational response actions.

Table 4.2 Seismic monitoring system, for seismic events > M1.0 with an epicenter within the AoR.

Operating State	Threshold Condition[1,2]	Response Action[3]
Green	Seismic events less than or equal to M1.5	1. Continue normal operation within permitted levels.
Yellow	Five (5) or more seismic events within a 30 day period having a magnitude greater than M1.5 but less than or equal to M2.0	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well.
Orange	Seismic event greater than M1.5 and local observation or felt report Seismic event greater than M2.0 and no felt report	1. Continue normal operation within permitted levels. 2. Within 24 hours of the incident, notify the UIC Program Director, of the operating status of the well. 3. Review seismic and operational data. 4. Report findings to the UIC Program Director and issue corrective actions.
Magenta	Seismic event greater than M2.0 and local observation or report	1. Initiate rate reduction plan. 2. Within 24 hours of the incident, notify the UIC Program Director, of the operating status of the well. 3. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 4. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 5. Determine if leaks to ground water or surface water occurred. 6. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. 7. Review seismic and operational data. 8. Report findings to the UIC Program Director and issue corrective actions.

[1] Specified magnitudes refer to magnitudes determined by local Project Minerva or USGS seismic monitoring stations or reported by the USGS National Earthquake Information Center using the national seismic network.

[2] "Felt report" and "local observation and report" refer to events confirmed by local reports of felt ground motion or reported on the USGS "Did You Feel It?" reporting system.

[3] Reporting findings to the UIC Program Director and issuing corrective action will occur within 25 business days (five weeks) of change in operating state.

Operating State	Threshold Condition[1,2]	Response Action[3]
Red	Seismic event greater than M2.0, and local observation or report, and local report and confirmation of damage[4] Seismic event >M3.5	1. Initiate shutdown plan. 2. Within 24 hours of the incident, notify the UIC Program Director of the operating status of the well. 3. Communicate with facility personnel and local authorities to initiate evacuation plans, as necessary. 4. Monitor well pressure, temperature, and annulus pressure to verify well status and determine the cause and extent of any failure; identify and implement appropriate remedial actions (in consultation with the UIC Program Director). 5. Determine if leaks to ground water or surface water occurred. 6. If USDW contamination is detected: a. Notify the UIC Program Director within 24 hours of the determination. 7. Review seismic and operational data. 8. Report findings to the UIC Program Director and issue corrective actions.

[4] Onset of damage is defined as cosmetic damage to structures, such as bricks dislodged from chimneys and parapet walls, broken windows, and fallen objects from walls, shelves, and cabinets.

5.0 Response Personnel and Equipment

Site personnel, project personnel, and local authorities will be relied upon to implement this ERRP.

Site personnel to be notified (not listed in order of notification):

1. Project Engineer(s)
2. Plant Safety Manager(s)
3. Environmental Manager(s)
4. Plant Manager
5. Plant Superintendent

A site-specific emergency contact list will be developed and maintained during the life of the project. Project Minerva will provide the current site-specific emergency contact list to the UIC Program Director.

Table 5.1. Contact information for key local, state, and other authorities.

Agency	Phone Number
Local police	337-589-3561 (Vinton Police Department)
State police	337-491-2511 (Troop D, Lake Charles)
State emergency management agency	337-721-3800 (Calcasieu), 337-775-7048 (Cameron)
Environmental services contractor	Vendor to be selected
UIC Program Director	
EPA National Response Center (24 hours)	800-424-8802
State geological survey	225-578-5320

Equipment needed in the event of an emergency and remedial response will vary, depending on the triggering emergency event. Response actions (cessation of injection, well shut-in, and evacuation) will generally not require specialized equipment to implement. Where specialized equipment (such as a drilling rig or logging equipment) is required, Project Minerva shall be responsible for its procurement.

6.0 Emergency Communications Plan

Project Minerva will communicate to the public about any event that requires an emergency response to ensure that the public understands what happened and whether or not there are any environmental or safety implications. The amount of information, timing, and communications method(s) will be appropriate to the event, its severity, whether any impacts to drinking water or other environmental resources occurred, any impacts to the surrounding community, and their awareness of the event.

Project Minerva will describe what happened, any impacts to the environment or other local resources, how the event was investigated, what responses were taken, and the status of the response. For responses that occur over the long-term (e.g., ongoing cleanups), Project Minerva will provide periodic updates on the progress of the response action(s).

Project Minerva will also communicate with entities who may need to be informed about or take action in response to the event, including local water systems, CO_2 source(s) and pipeline operators, land owners, and Regional Response Teams (as part of the National Response Team).

7.0 Plan Review

This ERRP shall be reviewed:

- At least once every five (5) years following its approval by the permitting agency;
- Within one (1) year of an area of review (AoR) reevaluation;
- Within Project Minerva following any significant changes to the injection process or the injection facility, or an emergency event; or
- As required by the permitting agency.

If the review indicates that no amendments to the ERRP are necessary, Project Minerva will provide the permitting agency with the documentation supporting the "no amendment necessary" determination.

If the review indicates that amendments to the ERRP are necessary, amendments shall be made and submitted to the permitting agency within Project Minerva following an event that initiates the ERRP review procedure.

8.0 Staff Training and Exercise Procedures

Training and exercise procedures (with appropriate manuals) will be compiled once a clear understanding of the facilities and personel are finalized.